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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/873,287	06/05/2001	Tomio Sugiyama	2635-16	4759

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EXAMINER
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OLSEN, KAJ K

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 05/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 09/873,287	<b>Applicant(s)</b> SUGIYAMA, TOMIO	
	<b>Examiner</b> Kaj K Olsen	<b>Art Unit</b> 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 March 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 and 13 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    - a) ☒ All    b) ☐ Some \*    c) ☐ None of:
    - 1. ☒ Certified copies of the priority documents have been received.
    - 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    - 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1, 2, 4-6 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al (USP 4,798,693) in view of Radford et al 3,843,400 or Kobayashi et al (USP 4,961,835).
3. Mase discloses a sensing element comprising a plurality of alumina sheets 18, 20, 24 (figures 1 and 20), 48, 82, 72, 76 (figure 8) and a plurality of zirconia sheets 2, 4, 6 (figures 1-2), 50, 56 62, 80 (figure 8). See col. 4, line 59 to col. 8, line 53; col. 11, lines 9-36. Applicant's claims differ by calling for a bonding boundary between an alumina sheet and a zirconia sheet to include a crystal phase containing silica. Radford disclose adding 0.5 to 2 mol% of silica to a zirconia solid electrolyte. See col. 2, line 71 to col. 3, line 24. Kobayashi discloses adding silica to a zirconia solid electrolyte. See Table 1 in column 5. It would have been obvious to add silica to the zirconia sheets of either Mase in view of Radford, because Radford discloses silica to be a sintering aid that would lower the sintering temperature of the zirconia (see col. 2, last line). It would also have been obvious for Mase to incorporate silica in its zirconia sheets in view of Kobayashi, because that would give the zirconia an advantageous coefficient of thermal expansion as well as better low temperature operating characteristics and better life characteristics (see col. 2, lines 58-66; col. 4, lines 11-51; Table 2 in column 5 of Kobayashi).

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4. Once the silica is incorporated into the zirconia, it is clear that the sintering process to laminate the sheets into a sensing element will inherently provide a boundary between an alumina sheet and a zirconia sheet that would include a crystal phase containing silica. As for claim 2, note that Radford at col. 3, lines 15-16 discloses the presence of both silica and calcia. As for claim 5, the coefficients of expansion for both zirconia and alumina are known and would inherently have a difference less than  $2 \times 10$  to the minus 6. As for claim 6, the sintering contraction coefficient difference must be inherent of the combination of references, since all the materials are the same as those employed by applicant.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable Mase in view of Radford or Kobayashi and in further view of Ishiguro et al (USP 4,851,105).

6. This claim further differs by calling for the bonding boundary to be undulated. Ishiguro discloses a zirconia sheet bonded to an alumina-containing sheet 12 at an undulating boundary. See figure 2(b). It would have been obvious for Mase to adopt the undulating boundary of Ishiguro in order to strength the anchoring/bonding of a zirconia sheet to an alumina sheet, as discussed at col. 6, lines 24-41 of Ishiguro.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase in view of Radford or Kobayashi and in further view of JP 9-26409.

8. This claim further differs by calling for a difference in the coefficients of expansion of the zirconia sheet and the alumina sheet to be less than  $2 \times 10$  to the minus 6. Japan 409 discloses having that difference to be between 0 and 0.2%. See page 4, lines 7-8 of the translation. It would have been obvious for either Mase to adopt a virtually zero difference between these coefficients, as taught by Japan, in order to minimize thermal stress.

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9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase in view of Radford or Kobayashi and in further view of JP 08- 114571.

10. This claim further differs by calling for a sintering contraction coefficient difference between a zirconia sheet and an alumina sheet to be less than 3%. Japan 1571 discloses such a sintering contraction coefficient difference. See the fourth line from the bottom of the English abstract. It would have been obvious for Mase to adopt this sintering contraction coefficient difference to minimize thermal stress.

11. Claims 1, 4-6, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mase in view of Hayakawa et al (USP 5,122,487).

12. Mase has been discussed previously as disclosing a device with a zirconia layer laminated to an alumina layer by sintering. Hayakawa discloses a zirconia solid electrolyte containing up to 0.2% silica as an impurity. See col. 2, lines 13-51. It would have been obvious for Mase to adopt the zirconia electrolyte of Hayakawa as its zirconia solid electrolyte, because of its good mechanical properties and high withstand voltage (see the abstract of Hayakawa). The silica would inherently create a silica-containing bonding boundary in Mase when the layers are sintered together. The fact that Hayakawa desires to rid its zirconia of silica impurity is irrelevant, because the patent makes it clear that silica is inevitably present in its zirconia.

13. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase in view of Hayakawa and Radford.

14. This claim further differs by calling for the presence of calcia in the bonding boundary. As discussed before, Radford shows the equivalence of yttria and calcia as a zirconia stabilizer. It would have been obvious for Mase to adopt a calcia stabilizer.

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15. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase in view of Hayakawa and Ishiguro.

16. This claim further differs by calling for the boundary between the zirconia and the alumina layers to be undulating. As discussed before, that was rendered obvious by Ishiguro.

17. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase in view of Hayakawa and JP 9-26409.

18. This claim further differs by calling for the difference in the coefficients of expansion of the zirconia layer and the alumina layer to be less than  $2 \times 10^{-6}$ . As discussed before, that was rendered obvious by JP '409.

19. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase in view of Hayakawa and JP 08-1 14571.

20. This claim further differs by calling for a sintering contraction coefficient difference between the zirconia layer and the alumina layer to be less than 3%. As discussed before, that is rendered obvious by Japan '571.

### ***Response to Arguments***

21. Applicant's arguments filed 3-9-2004 have been fully considered but they are not persuasive. Applicant urges that it would not have been obvious to rely on the silica teachings of Radford for the sensor of Mase. In particular, applicant urges this because Mase "does not require a lower sintering temperature" (arguments page 2). However, the criteria for obviousness is not whether a particular teaching would *require* a subsequent teaching or not, but rather whether one would have been *motivated* to utilize a particular teaching. In fact, it doesn't

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appear that Radford even requires the sintering aid. This is evidenced by the discussion that Radford teaches that the sintering could be performed at much higher temperatures, but it is desired to lower that sintering temperature (col. 3, lines 25-31). Because Radford desired lowering the sintering temperature even when the lowering of the sintering temperature was not required, one possessing ordinary skill in the art would have been motivated to also lower the sintering temperature of Mase.

22. Applicant also urges that Mase is drawn to a sensor that is free from warpage. This may be true but why would that desired conclusion lead one away from the teaching of Radford? In other words, why would someone who desires reduced warpage be led away from also wanting to also reduce their sintering temperature? These two goals do not appear to be in conflict with each other.

23. Applicant also urges that Radford teaching is specifically limited to its specific solid electrolytic cell. It is unclear how applicant came to this conclusion. Where in Radford's disclosure does it state that their particular use of a sintering aid is somehow limited to their particular embodiment of a gas sensor? Applicant appears to insinuate that this has to do with Radford's use of an organic resin. However, the examiner finds nothing in the disclosure of Radford that would lead one to conclude that Radford would only utilize silica when an organic resin was utilized. In addition, Mase *explicitly teaches* that they are utilizing an organic resin for their electrolyte (col. 11, line 65 through col. 12, line 6). Hence, even if the examiner found this argument persuasive, then Radford's teaching would be precisely relevant for the electrolyte of Mase because it is drawn to an electrolyte constructed with an organic resin.

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24. With respect to the rejections relying on Kobayashi, applicant's arguments appear to mirror those made with respect to Radford, namely that Mase does not "require" the better operating conditions or life characteristics and that the teachings of Kobayashi are limited to its specific sensor configuration. These arguments are unpersuasive for the same reasons that they were unpersuasive earlier (see the three preceding paragraphs). Applicant also urges that the instant invention is directed to a different characteristic problem than that addressed by Radford and Kobayashi. The examiner will not dispute this, but it has been well settled that a patent cannot be granted for the discovery of a result, even though it may have been unexpected good, which would have flown logically from the teaching of the prior art. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

25. With respect to the use of the teaching of Hayakawa (both as evidentiary and secondary teaching), this examiner is withdrawing the rejection under 102 because the previous examiner did not establish that the electrolyte of Mase inherently had silica impurities. However, the 103 rejection is being maintained. Applicant's arguments here also mirror the earlier arguments made with request to Radford and Kobayashi and are also unpersuasive. The examiner would also point out that the applicant has been presented with three different teachings showing the addition of silica to an electrolyte for sintering and mechanical purposes (i.e. Radford, Kobayashi, and Hayakawa), and applicant appears to be maintaining that each and every instance of the use of silica for these various teachings is somehow unique to only that reference and wouldn't be relevant to the teaching of Mase. The use of silica as a sintering aid is very well known in the art and these three teachings are not the only instances of the addition of silica to an

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electrolyte. Applicant's piecemeal attack of these three references ignores the larger case that is being made that the addition of silica to an electrolyte was notoriously old in the art.

### ***Conclusion***

26. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Thursday from 6:30 A.M. to 4:00 P.M. and on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Kaj Olsen', with a long, sweeping horizontal line extending to the right.

Kaj Olsen Ph.D.  
Primary Examiner  
AU 1753  
May 20, 2004